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FROM : H. Hoerlin, J-DO

SUBJECT: EYEBURN FOR SEVERAL YIELDS - THERMAL AND OVERPRESSURE DATA

SYMBOL : J0R-72-16

ROUGH DRAFT

I have made a series of eyeburn calculations using as inputs the measured outputs from 4 Dominic events (Derksen, NOL-TR-72-42), assuming slant distances of 20, 40 and 80 nm, target at 40,000 ft altitude, dark and light adapted eye. The safe dosages are taken from LA-4651, by J. Zinn, Figure 8; these thresholds are a bit lower (more conservative) than those proposed during a post Dominic eyeburn meeting held in Los Alamos in 1965. Air transmission was taken with $\beta = 0.025$/km, corresponding to a visibility better than "very clear" ($\beta = 0.06$/km) and not quite "exceptionally clear" ($\beta = 0.014$/km). The conclusions are listed in Tables I and II; they are conservative. Various assumptions were made, the worst case assumes a 150 msec blink at second max. A more detailed memo will be submitted shortly. Thermal and overpressure data are shown in Table III.

Distribution:

Cy. 1RD - W. E. Ogle, J-DO
2RD - D. M. Kerr, J-10
3RD - J. S. Malik, J-DO
4RD - H. Hoerlin, J-DO

SECRET

THT-72-233

TABLE I

A. NIGHT ADAPTED EYE

Tanana,	2.3 kt,	just about safe at 40 nm
Nambe,	43 kt,	not safe at 40 nm safe at 80 nm
Harlem,	1.1 Mt,	not safe at 40 nm near threshold at 80 nm
Yeso,	3.1 Mt,	not safe at 40 nm near threshold at 80 nm

B. LIGHT ADAPTED EYE

Tanana,	just about safe at 20 nm
Nambe,	not safe at 20 nm, but near threshold. Safe at larger distances.
Harlem,	not safe at 20 nm, just above threshold at 40 nm
Yeso,	similar to Harlem

TABLE II

HARLEM, 1100 kt

t_{1max} = 1.7 msec t_{min} = 95 ms t_{2max} ~ 1 sec

Aircraft at 40,000 ft

Slant Range naut. m.	Pulse msec	Image diam. microns	Dose, cal/cm^2 night	day	safe
20	0 - 2	100	.6	.1	.1
20	0 - 10	150	1.3	.2	.1
20	0 - 150	500	.3	.04	.4
20	850 - 1000	900	4.0	.6	.4
40	0 - 2	50	.4	.07	.1
40	0 - 10	75	.8	.1	.1
40	0 - 150	250	.2	.03	.7
40	850 - 1000	450	2.4	.4	.5
80	0 - 2	25	.2	.03	.2
80	0 - 10	40	.3	.05	.4
80	0 - 150	125	.1	.02	1.5
80	850 - 1000	225	.9	.15	.7

TABLE III

THERMAL, OVER PRESSURE AND SHOCK ARRIVAL PREDICTIONS

Source: 1.2, 3 and 20 Mt at ~ 500 m above sea level
Aircraft (target) at 40,000 ft and 10,000 ft altitude
Slant distance: 20 nautical miles

	1.2 Mt	3 Mt	20 Mt
Prompt thermal, cal/cm^2, max.			
40,000 ft	2.1	5	35
10,000 ft	1.8	4.5	30
Prompt thermal, cal/cm^2, probable			
40,000 ft	1	2.5	17
10,000 ft	.8	2	14
Allowable dose			
Sure safe	4.2	5.7	6.9
Mission complete	30	42	57
Overpressure,* psi			
40,000 ft	.1	.15	.35
10,000 ft	.21	.3	.7
Shock arrival, sec			
40,000 ft	111	106	97
10,000 ft	100	99	95

*Overpressure criteria for EC-135

.54 to 1.18 psi buckling of lower skin panel, but safe
2.1 psi radome failure
2.68 psi ~~sure kill~~ minor damage but safe return.